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Z/032/60/010/012/003/009

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Development and Investigation of the Properties of the Type CrMnN Austenitic Steel for Castings

work on this subject in 1958. At that time, the mechanical and other properties of such steel were not verified, not even in the wrought state and it was necessary to determine the basic properties of castings, to investigate the pertaining foundry technology and to gain more information on this material by means of semi-industrial and industrial heats. The developed steel has virtually no Ni content. The Mn content is 13-15%, the N content is very high (0.20 - 0.35%), whilst the Cr content remains around 17%. To retain the austenitic structure 4% Ni used in other Czech economy austenitic steels is substituted by an increased content in Mn and N. The main problem was to achieve the desired nitrogen content without running the risk of obtaining bubbles and porosities. The limit of solubility of the nitrogen was determined by the method of F.C. Langenberg (Ref. 9) at 0.33% for 1600 °C. The nitrogen was introduced

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in the form of a 93% Mn + 5.3% N alloy after complete melting of all the additions, deoxidation of the bath by ferro-silicon and measurement of the temperature by means of an immersion pyrometer. For verifying the state of the steel and its behaviour during solidification, specimens were drawn from the furnace and cast into chill moulds or into small dry or green sand moulds. Only after these tests was the experimental melt tapped from the 100-kg magnesite-lined induction furnace into a preheated 100-kg capacity ladle with a basic lining. After withdrawing the slag and measuring the temperature again, the steel was teemed into moulds. The time interval from the instant of adding the nitrogen up to the time of teeming was between 15 and 30 min; as an exception it was 1 hour for two heats when the effect of alternate cooling and heating of the melt on the final nitrogen content of the steel was investigated. The total

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duration was 2 to 2.5 hours. The nitrogen content determined by analysis was found to be in good agreement with the theoretically determined limit of solubility of the given steel at 1 600 °C. The laboratory tests were followed by tests in electric-arc furnaces of 250 kg (VZU LZ, Pilsen) and 1 000 kg capacity (Smeral Works, Brno). The chemical compositions (in %) of two heats produced in the 250-kg furnace are given in Table 5 and that of one heat produced in the 1 000-kg furnace is given in Table 6. The nitrogen was added in the form of an alloy (86% Mn, 5.27% N). The nitrogen losses amounted to 40-50% as compared with 6-15% during laboratory tests. The usual foundry tests were made for determining the foundry properties and for working out a technological process of casting this material. Similarly, the mechanical properties, heat-treatment, possibility of using this steel at elevated temperatures and the welding properties were studied. From the point of view of the  
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mechanical properties this material can be used reliably at temperatures up to 500 °C, although the similar American "Tenelon" steel is recommended for use up to temperatures of 700 °C. It is pointed out, however, that the structural stability of this steel drops considerably with increasing temperature and therefore use of this steel as a high-temperature resisting material is justified in applications in which the required service life is only a few tens or hundreds of hours and the favourable creep properties are important, provided that it is not necessary to consider fully the embrittlement of the components. In the case of fittings to be used in chemical plant or power-generation equipment this structural instability must be taken into consideration. The authors recommend for standardisation a new steel of the following composition: 0.08-0.18% C, Max. 1% Si, 13.0-15.5% Mn, 16.0-19.0% Cr, max. 2.0% Ni, 0.30-0.60% Mo, 0.30-0.50% Cu, 0.20-0.35% N, max. 0.050% P

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and 0.035% max. S. After austenisation annealing the material should have the following average mechanical properties:  $\sigma_{Kt} = 43 \text{ kg/mm}^2$ ,  $\sigma_{Pt} = 70 \text{ kg/mm}^2$ ,  $\delta_5 = 40\%$ ,  $\psi = 50\%$ , impact strength 10-25 mkg/cm<sup>2</sup>, depending on the chemical composition and the method of austenisation.

Table 5:	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	N
Specifi-	max.	13-14	max.	max.	max.	-	15.5	0.4	0.4	0.25
cation	0.15		0.65	0.050	0.040		to	to	to	to
							16.5	0.6	0.6	0.35
3814	0.16	17.23	0.67	0.017	0.012	0.22	17.04	0.42	0.48	0.34
3815	0.14	14.00	0.42	0.015	0.011	0.20	14.80	0.53	0.57	0.24

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Table 6:

	C	Mn	Si	P	S	Ni	Cr	Mo	Cu	N
Specifi-	max.	13.5	max.	max.	max.	1.7	16.5	0.3	0.3	0.20
cation	0.12	to	1.0	0.045	0.030		to	to	to	to
		15					17.5	0.45	0.5	0.25
20 006	0.12	14.0	1.20	0.036	0.007	1.68	17.20	0.23	0.37	0.23

There are 11 figures, 8 tables and 17 references: 8 Czech  
and 9 non-Czech.

ASSOCIATIONS: SVÚMT, Prague (Löbl, Šustek)  
VÚHŽ, Prague (Hýbek)

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S/137/62/000/010/013/028  
A052/A101

AUTHORS: Löbl, Karel, Potůček, Bedřich, Vystyd, Miloš, Hýbek, Karel  
TITLE: Austenitic heat-resisting stainless steel for castings  
PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 10, 1962, 77, abstract  
10I499 P (Czech. pat., no. 99833, June 15, 1961)

TEXT: The patent presents an austenitic steel containing (in %): 0.20 - 0.75 C,  $\leq 3$  Si, 6 - 16 Mn, 16 - 32 Cr,  $\leq 3$  Ni, 0.2 - 6 Mo, 0.15 - 0.75 N and also  $\leq 0.05$  B and  $\leq 20$  Co. The presence of B and Co contributes to heat resistance. These steels are characterized by a high heat and corrosion resistance and can be used for work at up to 1,000°C and in an atmosphere containing C and S.

V. Srednogorska ✓

[Abstracter's note: Complete translation]

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Z/034/61/000/001/002/021  
EO73/E535

AUTHORS: Löbl, Karel, Engineer and Hýbek, Karel, Engineer  
TITLE: Re-smelting of Scrap CrNiMnN Austenitic Steels 18  
PERIODICAL: Hutnické listy, 1961, No.1, pp.13-19

TEXT: Sufficient experience is now available on the use of 18/8 type CrNi steel scrap. New problems arose in conjunction with the development of new low nickel content economy steels. As a result of efforts over many years, nickel-free austenitic steels Mn17Cr7Ti (ČSN 17481) and also Mn17Cr10V (ČSN N7 482), Mn17Cr7MoV (ČSN N7 483) have been developed. From 1957 onwards, much attention has been paid in Czechoslovakia to substituting austenitic stainless CrNi 18/8 steels by steels with a higher Mn content plus a nitrogen content, as for instance the steel Cr18Mn10N14N (ČSN 17460) and also type Cr16Mn15N (ČSN N7 470), which is to be introduced shortly. In both cases the manganese content is between 10 and 18%, which influences appreciably the technology of smelting charges containing such scrap. The basic consequences caused by the difference in the chemical behaviour of the individual elements are reviewed. First, a theoretical analysis is given of the phenomena taking place during the refining by means of oxygen. Particular attention  
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is paid to calculating the reaction heat. The theoretical results arrived at confirmed the practical results obtained by Pachaly (Ref.10) on processing 100% scrap of the steel Mn19Cr10Ni1.5. The slag formation was controlled in such a way as to prevent development of manganese silicates, i.e. prior to blowing oxygen the melting slag was drawn off and new, purely lime slag was prepared. Oxygen blowing was started at 1635°C and the refining proceeded at a speed of 0.02% C/min down to 0.06% C. Following that, the slag was reduced by granular Al and drawn off. The bath temperature increased to 1945°C. The Cr utilisation was 96%, that of Mn was 66%. This experimental melt is dealt with in another paper (Ref.11) but some of the relevant data are contained in Table 4. Experiments on practical methods of processing scrap of these high Mn content economy steels have been going on since 1955. Some of the data are discussed. SVUMT, jointly with the Šmeral Works, Brno, started experiments in 1959 on solving the problem of using internal scrap of CrNiMnN and CrMnN stainless austenitic steels. Some of the results obtained in three experimental heats are described. There was particular interest in the behaviour of nitrogen. It was

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found that, after an initial drop, the nitrogen content remains unchanged. After evaluating the results of the first oxygen blast re-smelting of the CrNiMn steel scrap, two further melts were proceeded with in a 1-ton capacity arc furnace. The charge consisted of only 50% alloy scrap, the rest was carbon steel scrap. More intensive oxygen blowing was applied, more attention was paid to the reduction of the oxidizing slag and the high temperatures at the end of blowing in oxygen were utilised for rapid smelting of further alloying additions, primarily ferrochromium, as a result of which a quick drop in the temperature of the bath and the lining to the normal value was achieved. The results of this heat are tabulated. The following conclusions are arrived at:

1. 50 to 60% alloy scrap can be used in the charge.
2. The smelting should be carried out in such a way that, prior to blowing in oxygen, the melt should contain 0.25 to 0.30% C.
3. Prior to blowing oxygen, the slag should be prepared with lime in such a way as to avoid formation of manganosilicates.
4. Blowing of oxygen should be started at the highest possible temperatures and should be continued without interruption and with

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the maximum permissible intensity.

5. The bath should be decarburized only to the specific upper limit of the carbon content.

6. After termination of the oxidation period, there should be a reduction of the slag which contains metal oxides and then the bath and the lining of the furnace should be cooled as quickly as possible by throwing in lump scrap or alloying additions.

7. After reduction, the slag should be drawn off as quickly as possible and the melt should be terminated in accordance with the specified requirements.

Some Czech works have already tried re-smelting of such scrap in open hearth furnaces but this was done exclusively in the manufacture of steel intended for further shaping operations. In the described experimental melts, monitoring of the temperature was not entirely satisfactory due to the lack of suitable equipment for measuring the bath temperature. Also it was not possible to weigh the metal in the slag during the process of smelting. Acknowledgments are expressed to Vl. Steffek and Engineer P. Fremunt for practical

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Re-smelting of Scrap CrNiMnN Austenitic Steels

assistance and to the Director of SVÚMT, Engineer Mir. Svoboda, for his interest in the problem of introducing economy nitrogen-containing stainless austenitic steels for producing castings. There are 18 tables, 1 figure and 14 references: 6 Czech, 3 German and 5 English. ✓

ASSOCIATIONS: SVÚMT, Prague (Löbl) and VÚHŽ, Prague (Hýbek)

SUBMITTED: October 22, 1960

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Z/032/61/011/004/002/004

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AUTHORS: Hýbek, K., Šolc, J. and Zezulová, M., Engineers

TITLE: State of Development of CrMnNiN-type Austenitic Economy Steels

PERIODICAL: Strojřrenství, 1961, Vol. 11, No. 4,  
pp. 275 - 282

TEXT: The main aim of development of economy steels of this type was to save or completely substitute Ni. A break-through was achieved only after combining successfully the use of Mn with N. The combined used of these two elements enabled developing CrMnNiN steels which are suitable as a replacement for unstabilised CrNi steel (ČSN 17 241). Steels of this type are the US steels AISI 201 and 202 and the CrMnN steel described in an article in the 1958, No. 8, issue of this journal, which has so far not been included in the Czech standard specifications. In this paper the results are described of the development of economy austenitic steels which were achieved at VÚHZ with the cooperation of VŽKG and TZ VŘSR Stalingrad Works. The problem was investigated independently  
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by K. Protiva (Ref. 4 - Hutník, 1959, Vol.9, No. 12, pp. 396-399) (SONP, Kladno) in cooperation with SVUMT, Prague (Ref. 6 - B. Potůček: Economy Stainless CrNiMnN austenitic Steels MTS - Technical Report 201, Prague, 1960). The results are described only briefly, except for the properties of the steel and the experience gained during fabrication, which are described in greater detail. In preliminary experiments it was established that the chemical composition for production heats should be as follows: max. 0.12% C; 8-10% Mn; 17-19% Cr; 4-5% Ni; max. 0.035% S; max 0.035% P and 0.20-0.30% N. Two 3-ton heats were produced, one with a Ni content at the lower limit, the other at the higher limit. That the metallurgical process was satisfactory was proved by the process of casting and solidification during which the steel was not effervescent. That the correct forming technology was used was proved by the fact that for the selected sheet thicknesses of 1 and 2.4 mm the surface of the sheets was perfect. Thereby, the fact that the

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austenitic structure was stable even at higher forming temperatures was of great help. Metallographic tests showed that steel from both heats had a purely austenitic structure, both in the as-rolled state as well as after austenisation annealing at 1 030 to 1 050 °C, the optimum austenisation temperature being 1 000 to 1 100 °C. Even at the higher limit there was no grain coarsening. Corrosion tests gave good results and therefore this steel is recommended for consumer goods, i.e. kitchenware, dairy equipment and other food-industry applications as well as for components which are exposed to severe atmospheric conditions (for instance, railway carriages). The results of the mechanical tests are summarised in Tables 2, 3, 4 and 5. Table 2 gives the mechanical properties of 9 sheets from both heats, taken at random; the further tables indicate the effect of heat-treatment. The developed steel is fully equivalent to similar foreign steel and is superior as regards ductility. Weldability in the case of oxyacetylene, arc and argon-arc welding is good. The machineability is classified as 11b. It is particularly favourable to

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machine this material at elevated temperatures. However, the steel has to be protected against work hardening by pressure, bending, etc; if these peculiarities are taken into consideration, no difficulty will arise in machining this steel. The steel can be very satisfactorily polished both mechanically and by electrolytic methods. The forming properties are very good. In experiments with good-quality equipment reduction in the cold state of up to 90% without intermediate annealing was achieved, which means that from a sheet of 2.5 mm thickness a sheet of only 0.25 mm can be produced without intermediate annealing. Deep-drawing tests in producing pots and other kitchenware and also plates of a pasteurising column showed that the steel had very good forming properties. No difficulties arose in cutting, rolling, austenisation annealing, grinding and polishing of products from this steel. The main advantage of the recently developed CrMnNiN economy steel is the fact that its introduction into industry does not require any considerable change compared with the manufacture of current types of stainless steels, although slight changes

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in technology will be required in view of the higher strength values of this steel. From the technological point of view, the steel will also have a number of advantages. It was confirmed experimentally that the austenitic structure remained stable up to 1 260 °C, even if the Ni content was at the lowest limit. If the content of the austenite-forming elements was at the upper limit no two-phase structure developed even after two hours heating at 1 300 °C. On exceeding the austenisation temperature, for which the range 1 030 to 1 050 °C/min/air (the time was determined for sheet) was chosen. in view of the increased tendency to scale-formation for steels containing Mn, no undesirable change in the mechanical properties (particularly in the decisive property of elongation) occurred at temperatures up to 1 100 °C. Certain properties of this new steel justify the assumption that in many cases it will be not only a good substitute for the steel ČSN 17 241 and 17 242 but for certain applications it will even be superior to these steels. For instance, the higher strength values will enable maintaining a higher

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polish and a better resistance to abrasive wear. Furthermore, the higher strength of the material will enable reducing the weight by using thinner and lighter sheets. On the other hand, due to the higher strength values, manual forming operations of thicker sheets will be more difficult. The results of tests of the influence of cold-forming indicate an entirely new and wide field of application for these steels as a material for substituting special hardenable austenitic steels. Introduction of this stainless economy steel with only half the usual nickel content as compared with current types of CrNi steel is of very considerable economic importance. This steel is now being manufactured by SONP, Kladno and VŽKG, Ostrava, and the Trinecké zelezárny VRSR (Trinec Irons works VRSR) also intend to start manufacturing this steel. A specification is being drafted for the manufacture of a CrMnNiN steel (CSN 17 460), with the following proposed composition: max. 0.12% C, 7.5-10.5% Mn, max. 1.00% Si, 16.0-19.0% Cr, 4.0-6.0% Ni, 0.15%-0.30% N, max. 0.060% P and max. 0.035% S.

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There are 9 figures, 5 tables and 6 references: 5 Czech and  
1 non-Czech.

ASSOCIATION: Výzkumný ústav hutnictví železa, Praha  
(Research Institute for Ferrous Metals, Prague)

(Abstractor's note: key to Tables 3, 4 and 5 on card 12/12)

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**Table 2: Mechanical Properties of 9 sheets (from both heats) taken at random.**

1 - Number of test; 2 - sheet thickness, mm;  
3 - yield point, kg/mm<sup>2</sup>; 4 - tensile strength, kg/mm<sup>2</sup>;  
5 - elongation,  $\epsilon = 5d$ , %.

(1)	(2)	(3)	(4)	(5)
Číslo zkoušky	Tloušťka plechu (mm)	Max. protáhnutí (kg/mm <sup>2</sup> )	Pevnost v tahu, (kg/mm <sup>2</sup> )	Táhnout l = 5d (%)
1.	0,98	45,8	81,5	61,7
		47,8	82,4	63,7
2.	1,00	45,4	78,6	63,7
		47,3	81,6	63,7
3.	1,04	52,0	87,7	53,3
	1,02	53,4	88,6	55,5
4.	1,03	55,2	95,8	53,3
	1,00	55,2	89,6	50,0
5.	1,04	55,8	89,8	50,0
	1,04	54,0	87,9	55,5
6.	0,90	49,1	81,6	56,6
	0,92	48,7	82,0	55,7
7.	0,96	50,3	84,0	60,0
	0,98	49,7	84,1	61,7
8.	0,99	52,4	85,6	56,6
	1,00	50,9	84,7	61,7
9.	0,92	54,6	81,0	60,0
	0,92	53,6	83,0	63,3

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**Table 3:** Mechanical Properties of 1 mm thick sheet from the heat 2923 (Ni content 3.97-7.07%) (Erichsen tests gave a cupping depth of 12.5 mm, which is an average of 3 x 6 measurements)

① Označení	② Teplotné spracovanie	③ Mas priťažnosť (kg/mm <sup>2</sup> )	④ Pevnosť v tahu (kg/mm <sup>2</sup> )	⑤ Tuhnosť [%]		
				l = 5d	l = 10d	l = 1"
1	Stav po válcovaní	48,60	79,42	62,60	54,27	51,45
2	1000 °C/25'/voda	42,60	75,37	60,47	58,80	56,07
3	1025 °C/25'/voda	41,90	75,60	67,22	60,20	57,30
4	1050 °C/25'/voda	41,32	75,22	69,95	60,80	58,40
5	1075 °C/25'/voda	38,65	72,02	68,67	61,32	58,57
6	1100 °C/25'/voda	37,22	72,17	71,00	62,42	60,07
7	1050 °C/5'/voda	41,80	75,25	68,32	59,62	56,15
8	1050 °C/60'/voda	37,85	73,07	69,30	60,57	58,15
9	1050 °C/25'/vzduch	42,12	76,20	69,67	60,22	57,10

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Table 4: Mechanical properties of 2.4 mm thick sheet from the heat 2923 (Ni content 3.97-7.07%).

① Označení	② Teplotné spracovanie	③ Hes prítlačnosti (kg/mm <sup>2</sup> )	④ Pevnosť v tahu (kg/mm <sup>2</sup> )	⑤ Tuhosť [%]		
				I - 5d	I - 10d	I - 3"
23-1	Stav po válcovaní (L)	66,32	83,97	50,15	41,65	46,67
2	1000 °C/25'/voda (J)	40,20	74,02	64,50	58,30	61,95
3	1025 °C/25'/voda	40,15	73,80	64,40	57,37	62,05
4	1050 °C/25'/voda	41,05	73,75	64,75	57,35	62,35
5	1075 °C/25'/voda	39,80	73,32	66,37	58,25	63,80
6	1100 °C/25'/voda	39,80	72,67	67,40	59,02	64,80
7	1050 °C/5'/voda	41,52	74,32	62,30	54,52	59,95
8	1050 °C/80'/voda	39,57	73,75	64,40	55,25	60,80
9	1050 °C/25'/vzduch (S)	39,50	73,12	65,77	56,92	62,75

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Table 5: Mechanical properties of 2.4 mm thick sheet from the heat 2933 (Ni content 5.02-5.35%) (All specimens were cut in the transverse direction; the given values are averages of 4 measurements)

① Označení	② Teplotné spracovanie	③ Max prúťnosť (kg/mm <sup>2</sup> )	④ Pevnosť v ťahu (kg/mm <sup>2</sup> )	⑤ Ťažnosť (%)		
				l = 5d	l = 10d	l = 2"
33-1	Stav po válcovaní ⑥	84,67	97,97	38,25	30,75	35,80
2	1000 °C/25'/voda ①	47,32	81,22	59,32	50,52	56,10
3	1025 °C/25'/voda	47,65	80,60	58,72	51,05	55,95
4	1050 °C/25'/voda	46,75	80,40	59,17	50,65	56,70
5	1075 °C/25'/voda	45,97	79,00	61,35	52,42	58,50
6	1100 °C/25'/voda	44,95	77,50	61,95	51,85	58,67
7	1050 °C/5'/voda	49,55	81,57	57,50	49,45	55,90
8	1050 °C/60'/voda	46,57	79,05	58,92	50,37	56,35
9	1050 °C/25'/vzduch ⑤	46,12	79,05	57,65	49,07	54,15

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Key to Tables 3, 4 and 5:

- 1 - Number; 2 - Heat treatment;
- 3 - Yield point,  $\text{kg/mm}^2$ ; 4 - Tensile strength,  $\text{kg/mm}^2$
- 5 - Elongation, %; 6 - As-rolled state;
- 7 - voda = water; 8 - vzduch = air.

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LOBL, Karel, inz.; HYBEK, Karel, inz.

Remelting of the waste of CrNiMnN austenitic steels. Hut listy 16  
no.1:13-19 Ja '61.

1. Státní výzkumný ústav materiálu a technologie, Praha (for Lobl).
2. Výzkumný ústav hutnictví železa, Praha (for Hybek)



HYBEK, Karel, inz.

Production of oriented transformer sheets and its development in  
Czechoslovakia. El tech obzor 50 no.12;676-681 D '61.

1. Vyzkumny ustav hutnictvi zeleza, Praha.

KRAIS, S.; CHMELA, M.; HYBL, C.

Synthetic zeolites, molecular sieves. Ropa a uhlie 6  
no. 3: 81 Mr '64.

1. Research Institute of Crude Oil and Hydrocarbon  
Gases affiliated with the Slovnaft National Enter-  
prise, Bratislava.

HYBL, Cestmir

First National Seminar on Molecular Sieves. Chem prum  
14 no. 3: 164 Mr '64.

1. Research Institute of Crude Oil and Hydrocarbon Gases.

HYBL, C.; KRAIS, S.

Differential thermal analysis of a phosphoric catalyst. p. 146.  
(SILIKATY, Vol. 1, No. 2, 1957, Praha, Czechoslovakia)

SD: Monthly List of East European Accessions (EEAL) LC, Vol. 6, No. 12, Dec 1957. Uncl.

CZECHOSLOVAKIA/Analytical Chemistry. General Questions.

E-1

Abs Jour: Ref Zhur-Khim., No 13, 1958, 42993.

Author : Hybl C., Lhotsky O.

Inst :

Title : Gas Chromatography at a Plant Laboratory.

Orig Pub: Chem. prumysl, 1957, 7, No 8, 405-407.

Abstract: The analysis is conducted using two columns, connected in series, one of which is filled with  $Al_2O_3$  and the other with activated charcoal. The columns, 1000 mm in length and 5 mm in diameter, are placed in electrically heated jackets to which a stabilized voltage is supplied which permits to maintain a temperature within the range of 20-160°, with a maximum difference in temperature between the two columns of +3°. The

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APPROVED FOR RELEASE: Thursday, July 27, 2000

CIA-RDP86-00513R0005

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CZECHOSLOVAKIA/Analytical Chemistry. General Questions.

E-1

Abs Jour: Ref Zhur-Khim., No 13, 1958, 42993.

sample of gaseous mixture being analyzed is introduced into the columns and is eluted with a current of CO at a rate of 50 ml/minute. In this manner it is possible to separate mixtures of stable gases containing saturated and unsaturated  $C_1 - C_4$  hydrocarbons, including butadiene. For an analysis of the fractions use is made of a Zeiss gas-interferometer. To obviate the possibility of the formations of "tailings" on elution of higher hydrocarbons it is recommended to resort to a gradual heating of the  $Al_2O_3$  column. Elution of  $C_1H_4$ ,  $C_2H_4$  and  $C_3H_4$  in the activated charcoal column, at room temperature, requires approximately 1/2 hour, and therefore it is recommended to heat the column, which greatly accelerates the process

Card : 2/3

Thermogravimetry ...

Z/012/62/000/001/003/007  
E112/E453

Sieves 4A and 13X were synthesized directly, while the other types were prepared from the two former, by the exchange of sodium ions for calcium and potassium respectively. The present study was undertaken with the zeolites in powder form, without a binder. DTA-curves showed minima, corresponding to endothermic dehydration and two peak areas in a temperature range from 800 to 1000°C. It is submitted that already the first exothermic reaction (corresponding to first peak area) causes a change in the crystalline structure of the zeolite and that temperatures at which peak areas occurred were a function of the cation of the molecular sieve. Thus the first peak areas of the sodium zeolites 4A and 13X were approximately 50°C lower than those of the calcium products 5A and 10X. Highest first peak areas were shown by potassium zeolite 3.8A. X-ray diffraction studies showed that after reaching the first peak areas, the crystalline structure of all zeolites collapsed, giving rise to amorphous substances in the case of 3.8A, 5A and 10X. The sodium zeolites, i.e. 4A and 13X, formed at 820°C crystalline compounds which were identified as a mixture of  $\beta$ -cristobalite and nepheline. The authors have also

Card 2/4

Thermogravimetry ...

Z/012/62/000/001/003/007  
E112/E453

attempted to identify the reaction products formed after the second exothermic peak on the DTA-curves was reached. At 1000°C, crystalline materials are produced: kaliophilite from 3.8A, nepheline from 4A, a mixture of nepheline and plagioclase from 5A,  $\beta$ -cristobalite and nepheline from 13X and plagioclase from 10X. The efficiency of the zeolites as sorbents at varying temperatures was also studied by plotting isothermals (sorption of methanol from binary system methanol-benzene). It was seen that the zeolites lose sorbent efficiency already 200°C below the temperature of molecular sieve stability and it is therefore suggested that in industrial applications of zeolites as sorbents, a temperature of 600°C must not be exceeded. There are 4 figures and 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc. The reference to an English language publication reads as follows: Ref.3: R.M.Barrer: British Chemical Engineering, 1959, 267-279.

ASSOCIATION: Výskumný ústav pre ropu a uhlovodíkové plyny,  
Bratislava (Petroleum and Hydrocarbon Gas Research  
Institute, Bratislava)

SUBMITTED: May 18, 1961  
Card 3/4

S/001/63/000/004/006/051  
B102/B106

AUTHORS: Hybl, C., Jantula, J.

TITLE: Molecular sieves as humidity indicators

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 4, 1963, 105, abstract  
4B707 (Ropa a uhlie, v. 4, no. 6, 1962, 172-173; [Slovak;  
summaries in Russ., Eng., French, and Ger.] )

TEXT: The variation in color of A-type Ag, Ni, Na, and Co-Na zeolites  
was investigated as a function of the humidity content in the gases.  
These zeolites are more sensitive than paper impregnated with  $\text{CoBr}_2$   
solution. The Ag zeolite cannot be used when the gas contains  $\text{H}_2\text{S}$ .  
Abstracter's note: Complete translation.

Card 1/1



HYBL, C.; MADAR, J.; MATAS, M.

Thermographic study of properties of molecular sieves. Silikaty  
6 no.1:75-80 '62.

1. Vyskumny ustav pre ropu a uhlovodikove plyny, Bratislava.

SOJAK, L.; HYBL, C.

Molecular sieves in gas chromatography. Ropa a uhlie 7 no.1:26-29 Ja '65.

1. Research Institute of Petroleum and Hydrocarbon Gases of the Slovnaft National Enterprise, Bratislava.

HYBL, J.

Use of mathematical methods in operational research. p. 257.

TEXTIL . (Ministerstvo lehkeho prumyslu) Praha, Czechoslovakia,  
Vol. 14, no. 7, July 1959.

Monthly List of East European Accession (EEAI), LC Vol. 9, no. 2,  
Feb. 1960.

Uncl.

BEDNARIK, J., inz. (Praha); HYBL, J., inz., dr. (Praha); STRADAL, O.,  
doc., inz. (Praha)

Using mathematical models in designing a plant for casting  
prefabricated elements. Stavivo 40 no.12:410-413 D '62.

HYBL, Jaroslav, inz. dr.

Use of structural analysis in the woodworking industry.  
Drevo 18 no.7:243-244 J1 '63.

1. *Statni vyzkumny ustav ekonomickoorganizacni, Ministerstvo  
spotrebního průmyslu, Praha.*

KYBL, Jaroslav, inz. dr. ČSČ.

Better utilization of trucks by mathematical programming.  
Dřevo 19 no.2:51-53 F'62.

1. Státní ústav ekonomické organizace, Ministerstvo spotřeb-  
ního průmyslu, Praha.

HYBL, Jaroslav, ins. dr. CSc.

Modifications of limiting conditions in simplex tasks of linear programming. Podn org 19 no.1:20-22 Ja '65.

1. State Research Institute of Economics and Organization of the Ministry of Consumer Goods Industry, Prague.

HYBL M.  
EXCERPTA MEDICA Sec 15 Vol 13/3 Chest Dis. Mar 60

637. RESULTS OF TREATMENT OF BRONCHOGENIC CARCINOMA, OBTAINED BY THREE DIFFERENT METHODS OF IRRADIATION - Hybl M. and Rubeš R. Oncol., Reg. Inst. of Publ. Hlth, České Budějovice - NEOPLASMA 1958, 5/3 (283-292) Tables 8

In patients with primary, inoperable bronchogenic carcinoma treated during a 9 years' period by 3 different methods of irradiation (large, full fields; 8 small fields; and sieve irradiation), the results of treatment, as reflected by the average times of survival obtained, are reviewed. The longest average periods of survival (from the beginning of treatment) were gained by sieve irradiation (9.5 months), both in general and in the single groups of patients differentiated according to the tumour dose applied. Individually, the longest average time of survival was obtained by the method with a tumour dose over 5000 r. (11.2 months). The average



HYBLER, T.; VALIK, P., ins.

Report on the 1st National Conference on Deodorization of Fuel  
Gases. Paliva 43 no.6:182-183 Js '63.

T

6220H

Cracking of natural gas over nickel-magnesium catalyst.  
T. Hybl, *Patent 36, 202-7* (1954).--Cracking of natural  
gas with air or steam over a Ni-Mg catalyst is described.  
Various theories are also furnished. A cracking-plant  
diagram is furnished with a brief summary of chem. and  
technological process possibilities. Jgs. Legat.

HYBLER, T.

Results of the development of the Slovak gas industry during the  
past 10 years. p. 131.  
(PALIVA, vol. 35, no. 5, May 1955, Praha)

SO: Monthly List of East European Accession, (REAL), LC, Vol. 4,  
No. 11, Nov. 1955, Uncl.

MYSLER, T.

"Proper method of washing naphthalene with mineral oils and experience in washing naphthalene with special scrubbing oils at naphthalene and benzene washing installations."

PALIVA. Praha, Czechoslovakia. Vol. 35, no. 9, Sept. 1955.

Monthly list of East European Accessions (EEAI), LC, Vol. 3, No. 6, Jun 59, Unclass

HYBLER, T.; VALIK, P., inz.

Operational experiences in the petroleum and natural gas  
cracking by the cyclic method in the Slovak gas plants.  
Paliva 44 no.5/6:163-166 My-Je '64.

HYBLOVA, L.

VABATKO, J.; KOHN, R.; HYBLOVA, L. "Production of edible syrup from sorghum sugar. I. Purification of sorghum juices."

Chemicke Zvesti, Bratislava, Vol 6, No 1, Jan 1952, p. 1

SO: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress

VASATKO, J.; KOHN, R.; NYELOVA, L. "Production of edible syrup from sorghum sugar.

II. The quality of product."

Chemicke Zvesti, Bratislava, Vol 6, No 2, Feb 1952, p. 73

SO: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress

FILED, L.

VASILKO, J.; KORN, A.; KOLLOVA, L. "Production of edible wrap from conium sugar. III. Results of production tests."  
Chemické Zvesti, Bratislava, Vol 6, No 3/4 Mar./Apr., 1952, p. 161

SO: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress



HYBZA, J.

HYBZA, J. Speed drilling in cast iron. p. 270. Vol 29, no. 7, July 1956.  
MECHANIK, Warszawa, Poland.

SOURCE: East European Accessions List (EEAL) Vol. 6, No. 4--April 1957

COUNTRY	:	Poland	H-5
CATEGORY	:		
ABS. JOUR.	:	RZKhim., No. 22. 1959 No.	79827
AUTHOR	:	Hycnar, J.	
INST.	:	Not given	
TITLE	:	Methods of Utilizing Acid Sludges	
ORIG. PUB.	:	Wiadom Naft, 3, No 11, 12-14 (1957)	
ABSTRACT	:	A number of methods for the utilization of acid sludges obtained during the refining of petroleum products are described.	
		M. Zemlyanukhina	
CARD: 1/1		240	

HYCOM, Jan, mgr inz.

Drying transformer insulation under operational conditions.  
Energetyka Pol 17 no.10:311-315 0 '63.

HYCNAR, Jan

Inhibited transformer oils. Wiad naft 10 no. 1: 8-10 Ja '64.

HYCNAR, Jan, mgr inz.

Inhibitor-added transformer oil. Nafta Pol 20 no. 1: 18-23  
Ja '64.

1. Zaklad Energetyczny Okregu Poludniowego, Katowice.

HYCHAR, Jan

Methods of obtaining transformer oils. Wiad naft 10 no.3:68-71  
Mr'64.

P/025/60/000/005/002/002  
D003/D101

AUTHORS: Hycnar, Jan, Master Engineer, and Nastawny, Mieczysław,  
Master Engineer

TITLE: The importance of inhibiting insulation oils

PERIODICAL: Nafta, no. 5, 1960, 138-143

TEXT: The authors present a bibliographical review of the relationship of group composition of insulating oils, their dielectric stability and antioxidant properties. Methods of improving the stability of Polish-made transformer oils by addition of an inhibitor, the 2,6 di-tert butyl-4-methyl phenol, known as "Topanol O", are also described. "Topanol O" used for authors' tests was synthesized at the Laboratorium Chemiczno-Metalograficzne ZEOPd (Chemical-Metallographical Laboratory of the Power Association of the Southern District) from cresole fractions, alkylated with iso-butylene in the presence of sulfuric acid. The product with a melting temperature of  $69.3^{\circ}\text{C}$ , contained 99.2% of "Topanol o". Properties of this compound as an inhibitor were tested on fresh and regenerated insulating oils treat-

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P/025/60/000/005/002/002  
D003/D101

The importance of ....

ed with 0.3% "Topanol O". For comparison, samples of treated and non-treated oils were artificially oxidized on Baader's apparatus, in accordance with the DIN-51554 standard. Upon analyzing the results, the authors arrived at the following conclusions: 1) Addition of "Topanol O" at the rate of 0.3% does not deteriorate dielectric and physico-chemical properties of transformer oils; 2) when oxidized, oils treated with "Topanol O" produce not more than half the amount of acidic and saponificated products and sediments that appear in non-treated oils; 3) aging products of stabilized oils are less corrosive against copper. Since, according to bibliographical sources, stabilization extends the life of transformer oils by 2-5 times, tests with stabilized transformer oils should be undertaken on an industrial scale in Poland. In working out standards for stabilized oils, artificial aging of same and dielectric stability tests should be included. The authors suggest "Topanol O" as stabilizing agent which can be easily and cheaply produced from local raw materials. Following names of Soviet-bloc scientists are mentioned in this article: N. I. Chernozhukov, A. Y. Skoblo, S. Ye. Krein and K. I.

Card 2/3

The importance of ...

P/025/60/000/005/002/002  
D003/D101

Ivanov. There are 2 figures, 6 tables, 24 Soviet-bloc and 13 non-Soviet-bloc references. The references to the English-language publications read as follows: J. L. Jezl, A. P. Stuart, A. Schneider - Ind. and Eng. Chem. 1958, no. 6; C. E. Boozer, G. S. Hammand, C. E. Hamilton - J. of the Am. Chem. Soc. 1955, no. 12; C. E. Cook, N. G. Nassh, H. R. Flanagan - J. of the Am. Chem. Soc. 1955, no. 5; A. W. Stannett - Electr. Times, 1956, no. 3346.

ASSOCIATION: (Eng. Hycnar): Zakłady Energetyczne Okręgu Południowego, Katowice (Southern District Power Association), Katowice, (Eng. Nastawny): Rafineria Nafty (Oil Refinery), Trzebinia

Card 3/3



HYCNAR, Jan, mgr inz.

Prevention of aging of transformer insulation. Energetyka  
Pol 18 no.9:271-274 S '64

1. Electric Power Plants of the Southern District, Katowice.

HYCNAR, Jan, mgr inz.

Nitrogen protection of oil-filled transformers. Energetyka Pol 14  
no.6:176-180 Je '60. (EEAI 10:1)

1. Zakłady energetyczne Okręgu Południowego  
(Electric transformers)  
(Insulating oils)  
(Nitrogen)

HYCNAR, Jan, mgr inż.

Stabilization and regeneration of transformer and turbine oils by silica gel. Pt. 2. ~~Energetyka~~ Pol. 15 no.9: Suppl.: Energopomiar 7 no.2:277-281 S '61.

1. Zakłady Energetyczne Okręgu Południowego.

HYCNAR, Jan, Mgr. ins.

Stabilisation and regeneration of transformer and turbine oils using  
silica gel. Pt. 1. (To be cont'd.) Energetyka Pol 15 no.8:235-239  
Ag '61.

1. Zakłady Energetyczne Okręgu Południowego.

(Oils and fats)	(Electric transformers)
(Turbines)	(Silica)

HYPER, Jan

Methods of obtaining transformer obs. did not  
92-93 Ap '64

HYGNAR, Jan, mgr inz.

Causes for, and prevention of, aging of turbine oils.  
Energetyka Pol 17 no.3:75-80 Mr '63.

1. Zaklady Energetyczne Okregu Poludniowego, Katowice.

HYCNAR, Jan, mgr inz.

Firing boilers with liquid fuel in power production. Energetyka  
Pol 18 no. 4[1.6.5]132-139 My '64.

1. Power Plants of the Southern District, Katowice.

HYGNIE, Josef, Prof., Dr.

~~Intersexuality.~~ Cesk. gyn. 22[36] no.4:247-252 May 57.

1. K sedesatym narozeninam prim. MUDr. J. Jerie.  
(HERMAPHRODITISM  
(Cs))



HYGLIK, VLADIMIR

Banska Bystrica Martin, Osveta, 1957. 190p. (Banska Bystrica. 1st ed. chiefly illus.)

SO: Monthly Index of East European Accessions (EEAI) LC, Vol. 7, no. 1, Jan 1958

HYJEK, K.

Poznan Aero Club fights for records. p. 324. (SKRZYDLATA POLSKA, Vol. 10, No. 21, May 1954, Warszawa, Poland)

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 3, No. 12, Dec. 1954, Uncl.

HYKEL, J.

HYKEL, J.

Gas holes in aluminum casting. p. 238 (Slevarenstvi. Praha. Vol. 2, no. 8, Aug. 1954)

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 4, No. 6,  
June 1955, Uncl.

HYKEL, J.; STANEK, L.

Detonators, primers and electric detonators. p. 374. (STAVIVO, Vol. 35,  
No. 9, Sept 1957, Praha, Czechoslovakia)

SO: Monthly List of East European Accessions (REAL) LC, Vol. 6, No. 12, Dec 1957. Uncl.

HYKEL, J.

"Production of machinery and equipment for foundries." p. 169.

SLEVARENSTVI. (Ministerstvo tezkého strojírenství a Československá vědecká technická společnost pro hutnictví a slevarenství). Praha, Czechoslovakia, Vol. 7, No. 5, May 1959.

Monthly list of East European Accessions (EEAI), LC, Vol. 8, No. 8,  
August 1959.  
Uncla.

S/081/62/000/014/016/039  
B166/B144

AUTHOR: Hykel, Jindřich

TITLE: Production of lead azide

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 14, 1962, 382 - 383,  
abstract 14K91 (Czechoslovak Patent 98236, January 15, 1961)

TEXT: A solution of lead salt is added to an alkaline solution  $\text{NaN}_3$ . Precipitation is carried out in a medium of protective colloid (dextrin), whereupon the basic lead azide which forms is converted to  $\text{Pb}(\text{N}_3)_2$ . Before filtering the  $\text{Pb}(\text{N}_3)_2$  crystals the mother liquor is acidified. Example. 500 g of  $\text{NaN}_3$  are dissolved in 24.5 l of water heated to  $50^\circ\text{C}$ , and 10-20 g of  $\text{NaOH}$  are added to the solution; on completion of the dissolution the mixture is filtered. In another vessel 1300 g of  $\text{Pb}(\text{NO}_3)_2$  are dissolved in 24.5 l of water heated to  $50^\circ\text{C}$ ; after filtration this solution is transferred into a precipitation apparatus, where it is mixed with a solution of 60 g of dextrin in 0.5 l of water. With continuous stirring, the

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Production of lead azide

S/081/62/000/014/018/039  
B166/B144

alkaline  $\text{NaN}_3$  solution is then added to this mixture over 60-70 min during which the temperature at  $50^\circ\text{C}$ . When the  $\text{Pb}(\text{N}_3)_2$  precipitation is complete a solution of 40-50 ml of glacial  $\text{CH}_3\text{COOH}$  in 2-3 l of water is added to the mother liquor and stirred for 3-5 min. Then the mother liquor is drained off and the azide is washed on a Nutsch filter. The product contains 1-2.5% more  $\text{Pb}(\text{N}_3)_2$  than it would if the mother liquor were not acidified after precipitating the azide. [Abstracter's note: Complete translation.]

Card 2/2

HYKES, M., MUDr.

BK positivity in negative pulmonary findings. Prakt. lek.,  
Praha 35 no.15-16:344-346 20 Aug 55.

1. Reditel lecebny tuberkulosy v Martinove Udoli, p. Cvikov  
MUDr. A. Tomanek. Vyskumny ustav tbc, Praha-Bulovka.

(TUBERCULOSIS, PULMONARY, diagnosis,  
M.tuberc. positivity in negative pulm. findings)

(MYCOBACTERIUM TUBERCULOSIS  
positive finding in diag. of pulm. tuberc. in  
negative pulm. findings)



**HYLES, O.V.**

Academy of science proposed by Jan Ev. Purkyne. Chesh. fiziol. 1  
no.3:178-184 Sept 52.

1. Biologicheskii institut pedagogicheskogo fakul'teta universiteta  
im. Karla IV., Praha.

(SCIENCE,  
Czech. Acad. of Science)

HYKES, O. [V.]

"Purkyne's Monument." p. 86 (CASOPIS LETARU CESKYCH, Vol. 93, No. 3, Jan. 1954) Praha  
Czechoslovakia

SO: Monthly List of East European Accessions, Library of Congress, Vol. 3, No. 4,  
April 1954. Unclassified.

TEMPSKI, Julian; OLSZEWSKA, Zofia; HYKO-PORĘBSKI, Jan

Evaluation of the results of treatment of neurosyphilis by penicillin and fever therapy. Przegl. dermat., Warsz. 7 no.1:39-47 Jan-Feb 57.

1. Z Kliniki Dermatologicznej A. M. w Łodzi Dyrektor: doc. dr J. Intowicki. Adres: Łódź, Klinika Dermatologiczna Akademii Medycznej, Tramwajowa 15.

(NEUROSYPHILIS, ther.

penicillin alone & with fever ther., comparison (Pol))

(PENICILLIN, ther. use

neurosyphilis, alone & with fever ther., comparison (Pol))

(FEVER THERAPY, in various dis.

neurosyphilis, with penicillin, comparison with penicillin alone (Pol))

HYKES, C., JIRSA, M.

A simple method of column chromatography of bromsulphalein.  
Cesk. farm. 13 no.10:505-506 D '64

1. Laborator pro patofysiologii krve. pro soustavu a jater  
fakulty vseobecného lékařství Karlov university, Praha.

HYLA, Bohdan

Remote follow-up in hydrocephalus. Neurol., neurochir., psychiat.  
Pol. 14 no.3:421-424 My-Je '64

1. Z Oddziału Neurologii Dziecięcej imeni J. Korczaka przy  
Klinice Chorob Nerwowych Akademii Medycznej w Gdańsku  
(Kierownik Kliniki: prof. dr. Z. Majewska).

DAVID, A.; SRBOVA, J.; HYKES, P.; WAGNER, J.

Acute poisoning with aniline and nitrobenzene. Contribution to data on morphological and biochemical changes in the blood and their course. *Cas. lek. cesk.* 103 no.45:1251-1256 6 N '64.

1. Klinika nemoci z povolani fakulty vseobecneho lekarstvi  
Karlovy University v Praze (prednosta prof. dr. J. Teisinger)  
I ustav pro chemii lecarskou fakulty vseobecneho lekarstvi  
Karlovy University v Praze, (prednosta prof. dr. K. Kac1).

HYKES, P.; JIRSA, M.; HOENIG, V.

Metabolism of a halogen analogue of bromsulphalein in rats.  
Sborn. lek. 67 no.10:294-297 O '65.

1. Laborator pro patofyziologii krevetvorby a jater pri I.  
interni klinice fakulty vseobecneho lekarstvi University  
Karlovy v Praze (prednosta prof. dr. V. Hoenig, DrSc.).

HYKES, P.; JIRSA, M.; HOENIG, V.

Chromatography of commercial bromsulphalein preparations.  
Cas. lek. Cesk. 104 no.43:1193-1194 29 0 '65.

1. Laborator pro patofyziologii krvetvorby a jater pri I. interni  
klinice fakulty vseobecneho lekarstvi Karlovy University v Praze  
(prednata prof. dr. V. Hoenig, DrSc.).



HYLA, Z.

Modern machinery for soil stabilization. p. 122. (Drogownictwo, Vol. 12,  
No. 5, May 1957, Warsaw, Poland)

SO: Monthly List of East European Accessions (FEAL) IC, Vol. 6, No. 8, Aug 1957. Uncl.

38725  
S/194/62/000/005/002/157  
D222/D309

9.7100

AUTHOR: Hylebrant, Karel

TITLE: A list of programming plates for the Aritma 520 calculator

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 5, 1962, abstract 5-1-57v (Inform. služba pracovniky SPS Aritma, 1961, no. 25, 508-510).

TEXT: A list of 72 plates for the Aritma 520 calculator is given with a short description of the operations which can be executed with them: addition and subtraction (15 operations), multiplication (21 operations), division (11 operations) and composite operations, such as multiplications of the type  $\pm A.(\pm B) \pm C \dots$  and  $\pm A.(\pm B \pm C \dots)$  (14 operations), and divisions of the type  $\pm A:(\pm B \pm C)$  and  $(\pm A \pm B): \pm C$  (11 operations). 16 standard plates, giving the simplest operations - addition, multiplication, division and composite multiplication of the type  $\pm A.(\pm B \pm C) \dots$  - are included in the basic machine, while the remaining ones are to be ordered separately. [Abstractor's note: Complete translation].  
Card 1/1

38726

S/194/62/000/005/003/157  
D222/D309

9.7180

AUTHORS: Hylebrant, Karel and Kliner, Josef

TITLE: New programming plates for the Aritma 520

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika,  
no. 5, 1962, abstract 5-1-57k (Inform. služba pracov-  
niky SPS Aritma, 1961, no. 26, 498-508)

TEXT: New plates are described for the programming of the division  
( $\pm A \pm B$ );  $\pm C$  at a speed of 4000 operations/hour (plate no. 38),  
for the checking of this operation obtained by a multiplication exe-  
cuted at the same speed (plate no. 39), for the multiplication  
 $\pm A.(\pm B \pm C)$  at a speed of 8000 operations/hour (plate no. 40), and  
for checking of this operation at the same speed (plate no. 41). All  
operations can be executed on 9-digit decimal numbers. Time-diagrams  
of the operation of the calculator are given, together with a draw-  
ing of the plates, and an example of a composite division is follow-  
ed through, indicating the sequential operation of individual ele-  
ments and units. 8 figures. [Abstractor's note: Complete transla-  
tion].

Card 1/1

HYLINSKI, Wieslaw, mgr. inż.

Complete steel support of the pile wall without applying  
stacks along the sub-wall drift. Wład gorn 13 no.1:17-19  
Ja '62.

HYIMAR, Bohumil, inz.; OLSANSKY, Cestmir; MINARIK, Rudolf

Production of Edam cheeses by using cultures of Lactobacillus casei. Prum potravin 14 no. 12:656-659 D '63.

1. Sdruzeni mlekaren, Vyroba cistych mlekarskych kultur, Praha (for Hyimar).
2. Vyzkumny ustav mlekarensky, Praha, pracoviste Zeletava (for Olsansky).
3. Lacrum, n.p., Zeletava (for Minarik).

HYLMAR, Bohumil; ORSZAGHOVA, Venceslava

Osmophilic yeasts in the food industry and a new technique in their determination by the paper testing method. Listy cukrovar 80 no. 1:18-23 Ja '64.

1. Sdruzeni mlekaren, Praha (for Hylmar).
2. Ceske cokoladovny, Praha (for Orszaghova).

HYLMAR, Bohumil; VOKOUNOVA, Libuse

Selection and preparation of suitable lactic fermentation bacteria cultures for inoculation of beet cossettes. Listy cukro-  
var 80 no.4:88-93 Ap '64.

1. Vyrobná čistých mlékarských kultur, Prague (for Hylmar).
2. Research Institute of Sugar Industry, Modrany near Prague (for Vokounova).

HYLMAR, B.

TECHNOLOGY

periodicals: PRUMYSL POTRAVIN Vol. 9, no. 10, Oct. 1958

HYLMAR, B. Making of butter by adding a reduced quantity of yeast culture. p. 520.

Monthly List of East European Accessions (EEAI) LC Vol. 8, no. 5  
May 1959, Unclass.



HYLMAR, B.;TEPLY, M.;MAZA, V.

New technique of microbiological control in the food industry. p. 408

PRUMYSL POTRAVIN. (Ministerstvo potravinarskeho prumyslu) Praha,  
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